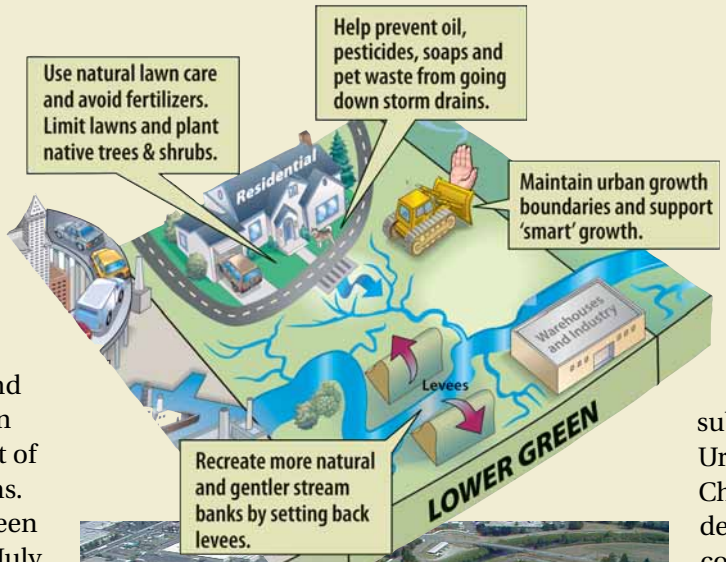

The Lower Green River Subwatershed contains a mix of industrial, commercial, and residential land uses as is shown here in Kent. A limited amount of agriculture also remains. The levee-confined Green River flows through it. July 2004 photo.

The Lower Green River Subwatershed begins at river mile 32 near Auburn and extends 21 miles to river mile 11 in Tukwila. The diversions of the White River and the Cedar/Black River from the Green River have had a major effect on flows in the Lower Green. Diminished instream flow levels, limitation of off-channel refuge habitat, and loss of sediment recruitment are key concerns. The Lower Green River Subwatershed is important for juvenile rearing but flood-control levees, water diversions, and urbanization have reduced the amount of habitat available to salmon in the subwatershed, particularly in terms of off-channel refuge habitats. Some spawning habitat exists in the upper portions of the mainstem above river mile 25. The subwatershed contains three major tributaries – Springbrook Creek, Mullen Slough, and Mill Creek – and a number of smaller creeks. Water quality in the tributaries is degraded, streams are channelized, and non-native plant species have invaded. Virtually the entire subwatershed is in the Urban Growth Area. (See Chapter 4 for a more detailed description of conditions in the Lower Green River Subwatershed.)

The following portfolio of polices and actions is designed to:

- Protect and restore habitat that provides refugia (particularly side channels, off channels, and tributary access) and habitat complexity (particularly pools) for juvenile salmon over a range of flow conditions and at a variety of locations (e.g., mainstem channel edge, river bends, and tributary mouths);
- Enhance natural sediment recruitment (particularly spawning gravels) by reconnecting sediment sources to the river;
- Preserve and maintain groundwater inflow from historical White River channel in Auburn; and
- Modify the Black River Pump Station to improve fish passage (a study of fish passage improvements is included in Volume II: Appendix J, Section J.5).

POLICIES PROJECTS

Policy LG1:

In the Lower Green River, every opportunity should be taken to set back levees and revetments to the maximum extent practicable. Habitat rehabilitation within the Lower Green River corridor should be included in all new developments and re-developments that occur within 200 feet of the river.

Project LG-1:
Riverside Estates Side Channel Rehabilitation at RM 28.8 (Left Bank)

LINKAGES

Conservation Hypotheses Addressed

- *Protecting water quality (All-1)*
- *Protecting and improving riparian vegetation (All-2)*
- *Protecting and improving access to tributaries (All-3)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (Low-1)*

Habitat Management Strategies

- *Restore tributary access*
- *Rehabilitate riparian areas by establishing suitable native vegetation along banks of the mainstem and tributaries*
- *Substitute loss of slow water areas by creating new off-channel habitats and/or placement of large woody debris along banklines*
- *Substitute ecological processes with habitat features*

Project Description

This project would re-establish side channel habitat to provide summer rearing habitat and winter refuge while maintaining the existing level of flood protection.

The project would create a groundwater collection pond at the head of the side channel to provide water for low summer flows, replace the existing flap-gated culvert with a new self-regulating tidegate, and connect the collection pond with the mainstem of the Green River with a new channel between the pond and the new tidegate. The new channel would be approximately 1,500 feet in length and constructed to permit conveyance of approximately 1-2 cubic feet per second during low flow conditions.

This is a Green/Duwamish Ecosystem Restoration Project.

Opportunities and Constraints

- This project depends on voluntary participation by property owners through easement, sale, or other incentives.

Replace This Page with Figure 7-3

(See separate 11x17 file)

Project LG-2:
Olson Creek Restoration at RM 28.5 (Right Bank)

Project Description

This project would improve access to the Olson Creek tributary from the Green River, restore tributary habitat, restore natural habitat-creating processes, and provide summer and winter rearing and refuge habitat for salmonid species.

The project would remove excessive sediment from the creek, creating a two-stage channel that provides additional stream depth during low flow conditions. The culvert located under Green River Road would be evaluated and replaced if necessary. Excessive sediment in the channel appears to be from a major storm event that has not re-occurred recently.

This is a Green/Duwamish Ecosystem Restoration Project.

Opportunities and Constraints

- Flows during the summer are colder than the Green River and considered high quality.
- The failure of an upstream culvert and erosion from the area has caused sediment laden pools, reducing the quality of salmonid habitat and the transport capacity in the reach.

Olson Creek looking downstream to one of the historical buildings on the Auburn Park property. Photo courtesy of U.S. Army Corps of Engineers.

LINKAGES

Conservation Hypotheses Addressed

- *Protecting water quality (All-1)*
- *Protecting and improving riparian vegetation (All-2)*
- *Protecting and improving access to tributaries (All-3)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (Low-1)*

Habitat Management Strategies

- *Restore tributary access by removing fish passage barriers and modifying tributary mouth configuration*
- *Rehabilitate riparian areas by establishing suitable native vegetation along banks of the mainstem and tributaries*
- *Rehabilitate hydrologic processes to maintain adequate instream flow to provide access to tributaries*

Project LG-3:
Horsehead Bend Off-Channel Habitat Restoration at RM 26 (Left Bank)

Aerial view of Horsehead Bend. Photo courtesy of U.S. Army Corps of Engineers.

LINKAGES

Conservation Hypotheses Addressed

- *Protecting water quality (All-1)*
- *Protecting and improving riparian vegetation (All-2)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (Low-1)*

Habitat Management Strategies

- *Rehabilitate riparian areas by establishing suitable native vegetation along banks of the mainstem and tributaries*
- *Substitute loss of slow water areas by creating new off-channel habitats and/or placement of large woody debris along banklines*
- *Substitute ecological processes with habitat features*

Project Description

This project would excavate an off-channel habitat through a terrace in a manner that would avoid potential fish stranding. The channel would be approximately 950 linear feet in length and would follow the old river channel, terminating at a depression located on the east side of the terrace. The project also would rehabilitate floodplain wetland habitat, plant native riparian vegetation, and add large woody debris.

This project is one of three separate but related projects in the Horsehead Bend/Horseneck area (see LG-4 and LG-5). The further development and implementation of one or more of these projects will require additional discussion among King County land managers because the Horsehead Bend and Horseneck parcels are managed for different purposes. Future discussion will identify the best ways to manage the two properties to meet four goals: restoring salmon habitat, preserving the agricultural land base, meeting recreational land uses (by extending the Green River Trail), and providing for flood protection.

This is a Green/Duwamish Ecosystem Restoration Project.

Opportunities and Constraints

- Deed restrictions on the Horsehead Bend property, limiting its use to outdoor recreation, would need to be accommodated in order to increase salmon habitat as an additional use.

Project LG-4:
Horseneck Off-Channel Habitat Restoration at RM 25.9 (Left Bank)

Project Description

This project would excavate backwater off-channel flood refugium to create juvenile salmonid rearing habitat, restore floodplain wetland habitat, add large woody debris, and plant native wetland and riparian vegetation at the Horsehead/Horseneck site.

This project is one of three separate but related projects in the Horsehead Bend/Horseneck area (see LG-3 and LG-5). The further development and implementation of one or more of these projects will require further discussion among King County land managers because the Horsehead Bend and Horseneck parcels are managed for different purposes. Future discussion will identify the best ways to manage the two properties to meet four goals: restoring salmon habitat, preserving the agricultural land base, meeting recreational land uses (by extending the Green River Trail), and providing for flood protection.

This project is adjacent to Green/Duwamish Ecosystem Restoration Project sites (LG-3 and LG-5).

Opportunities and Constraints

- Deed restrictions on the Horseneck property, limiting its use to agriculture as a Farmland Preservation Property, would need to be accommodated in order to increase salmon habitat as an additional use.
- Salmon habitat restoration may provide an opportunity to improve drainage on adjacent farmland.

Horsehead Bend, looking northwest toward Kent. Project area is in center of photo where "horse's jaw" meets the "horse's neck." August 2004 photo.

LINKAGES

Conservation Hypotheses Addressed

- *Protecting and improving riparian vegetation (All-2)*
- *Preventing new bank/shoreline armoring and fill and removing existing armoring (All-6)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (Low-1)*

Habitat Management Strategies

- *Rehabilitate existing banklines to create low velocity and/or shallow water habitat during juvenile migration*
- *Rehabilitate riparian areas by establishing suitable native vegetation along banks of the mainstem and tributaries*
- *Substitute loss of slow water areas by creating new off-channel habitats and/or placement of large woody debris along banklines*
- *Substitute ecological processes with habitat features*

Project LG-5:
Northeast Auburn Creek Rehabilitation at RM 25.6 (Left Bank)

Aerial view of NE Auburn Creek confluence with the Green, looking southwest. Photo courtesy of U.S. Army Corps of Engineers.

LINKAGES

Conservation Hypotheses Addressed

- *Protecting water quality (All-1)*
- *Protecting and improving riparian vegetation (All-2)*
- *Protecting and improving access to tributaries (All-3)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (Low-1)*

Habitat Management Strategies

- *Restore tributary access*
- *Rehabilitate existing banklines to create low velocity and/or shallow water habitat during juvenile migration*
- *Rehabilitate riparian areas by establishing suitable native vegetation along banks of the mainstem and tributaries*
- *Substitute loss of slow water areas by creating new off-channel habitats and/or placement of large woody debris along banklines*
- *Substitute ecological processes with habitat features*

Project Description

The project would provide juvenile fish access to rearing and refuge habitat within Northeast Auburn Creek. The project would eliminate the existing flapgate/culvert and improve the tributary by increasing creek habitat diversity. A bridge would be installed to maintain access across the channel. The project also would rehabilitate floodplain wetland habitat, plant native riparian vegetation, and add large woody debris. The riparian planting zone should extend 50 feet, or as wide as possible, on both sides of the channel.

This project is one of three separate but related projects in the Horsehead Bend/Horseneck area (see LG-3 and LG-4). The further development and implementation of one or more of these projects will require additional discussion among King County land managers because the Horsehead Bend and Horseneck parcels are managed for different purposes. Future discussion will identify the best ways to manage the two properties to meet four goals: restoring salmon habitat, preserving the agricultural land base, meeting recreational land uses (by extending the Green River Trail), and providing for flood protection.

This is a Green/Duwamish Ecosystem Restoration Project.

Opportunities and Constraints

- The riparian corridor of NE Auburn Creek is dominated by cottonwood for about 2,000 feet immediately above the existing flap-gated culvert, providing healthy habitat once fish access is restored.
- Upstream of the cottonwood, the riparian vegetation is dominated by a monoculture of invasive Himalayan blackberry.

Project LG-6:
Acquisition, Revetment Setback, Floodplain Wetland Restoration and Off-Channel Habitat Rehabilitation Between RM 25.1 and 24.3 (Left Bank)

Project Description

Acquire and remove auto wrecking yards to create space for a habitat rehabilitation project. Proposed actions include removing contaminated soils, re-sloping an over-steepened revetment segment along 78th Avenue S. to create a low bench, restoring a floodplain wetland, excavating an off-channel flood refugium for juvenile salmonid rearing habitat, installing large woody debris, and planting native wetland and riparian vegetation.

Opportunities and Constraints

- This project depends on voluntary sale by the landowner. This property is believed to have significant soil contamination that would have to be remediated.

LINKAGES

Conservation Hypotheses Addressed

- *Protecting water quality (All-1)*
- *Protecting and improving riparian vegetation (All-2)*
- *Preventing new bank/shoreline armoring and fill and removing existing armoring (All-6)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (Low-1)*

Habitat Management Strategies

- *Rehabilitate existing banklines to create low velocity and/or shallow water habitat during juvenile migration*
- *Rehabilitate riparian areas by establishing suitable native vegetation along banks of the mainstem and tributaries*
- *Substitute loss of slow water areas by creating new off-channel habitats and/or placement of large woody debris along banklines*
- *Substitute ecological processes with habitat features*

Project LG-7:
Lower Mill Creek, Riverview (Formerly Green River) Park, Hawley Road Levee, and Lower Mullen Slough Restoration Between RM 24 and 21.3 (Both Banks)

Project Description

This suite of projects would be coordinated on lands that are adjacent and/or share a floodplain. The goals and nature of the projects are similar.

Overall goals are to restore habitat along the mainstem and lower sections of Mill Creek and Mullen Slough by:

- Creating off-channel habitat for rearing and flood refugia and over-wintering habitat;
- Reconnecting mainstem and tributaries with portions of the floodplain;
- Setting back levees to improve bank conditions and create shallow water vegetated benches;
- Installing anchored large woody debris; and
- Controlling invasive plant species and planting with native plants.

View from Riverview Park of Mill Creek confluence with the Green River. April 2004 photo.

These projects are being coordinated by the City of Kent, King County, and the U.S. Army Corps of Engineers. Sub-projects include:

- **Lower Mill Creek Floodplain Wetland and Off-Channel Habitat Rehabilitation:** This project includes restoration of the lower 0.3 miles of Mill Creek and adjacent segments of the currently armored riverbank. The project would include excavation of off-channel habitat on the right bank of Mill Creek and reshaping the stream banks and the mainstem left bank of the Green River. This would create a more complex channel and aquatic edge habitat that includes off-channel habitat and large woody debris. This project would create nine acres of off-channel and riparian habitat adjacent to lower Mill Creek and restore approximately 1,600 lineal feet of lower Mill Creek
- **Riverview (Formerly Green River) Park:** This project is located opposite from the mouth of Mill Creek, on the right bank of the Green River. The project would provide summer rearing habitat and high flow winter refuge through excavation of an off channel area combined with placement of large woody debris and revegetation. Land is in public ownership and belongs to the City of Kent. This is a Green/Duwamish Ecosystem Restoration Project.
- **Hawley Revetment:** This project would to set back the over-steepened Hawley Revetment between river miles 23.5 and 23.3, in order to achieve a more stable slope angle, create a low, vegetated bench, and allow the placement of large woody debris. Land is in public ownership and is immediately downstream of Riverview Park.

- **Lower Mullen Slough (also known as Prentice Nursery Reach of Mullen Slough) at RM 21.4 (Left Bank):** This project would improve fish passage and create a natural habitat for rearing and refuge from high flows in the Green River mainstem. This project would restore the mouth of Mullen Slough and connect with a nearby pond, creating a new flatter-gradient meandering outlet for the pond. Actions include improving the channel to eliminate a summer low flow fish passage blockage, clearing the site of junk and Himalayan blackberry, planting riparian vegetation, placement of large woody debris, and construction of channel branches (dendrites) for improved flow and diversity. This is a Green/Duwamish Ecosystem Restoration Project.
- **Mullen Slough (Slough Mile 1.8-0.3):** This project would create a natural habitat for rearing and refuge from high flows in the Green River mainstem. Restoration along the slough would include channel meandering, large woody debris placement, and riparian plantings. This project site is upstream from the Prentice Nursery Reach project (previous sub-project) and includes about 90 acres from Highway 516 to the head of the slough. This is a Green/Duwamish Ecosystem Restoration Project.
- **Lower Mill Creek Future Project:** The City of Kent has proposed an additional setback of the levee near the mouth of Mill Creek and four acres of riparian planting.

Opportunities and Constraints

- Although much of the property is presently in public ownership, additional parcels may be needed and may have agricultural constraints. However, in several instances landowners already have expressed a willingness to sell.
- The river has down-cut over the years and the off-channel excavation will be extensive.

Area of Riverview Park that would be location for constructed off-channel habitat. Project would connect to the Green River beyond the line of cottonwood trees. September 2002 photo.

LINKAGES

Conservation Hypotheses Addressed

- *Protecting water quality (All-1)*
- *Protecting and improving riparian vegetation (All-2)*
- *Protecting and improving access to tributaries (All-3)*
- *Preventing new bank/shoreline armoring and fill and removing existing armoring (All-6)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (Low-1)*

Habitat Management Strategies

- *Restore tributary access by removing fish passage barriers and modifying tributary mouth configuration*
- *Rehabilitate existing banklines to create low velocity and/or shallow water habitat during juvenile migration*
- *Rehabilitate off-channel habitat by reconnecting habitats to the mainstem*
- *Rehabilitate riparian areas by establishing suitable native vegetation along banks of the mainstem and tributaries*
- *Rehabilitate remaining wetlands adjacent to mainstem channel*
- *Substitute loss of slow water areas by creating new off-channel habitats and/or placement of large woody debris along banklines*
- *Substitute ecological processes with habitat features*

Project LG-8:
Schuler Brothers Reach Rehabilitation on Mill Creek Between Creek Miles 0.3 and 2.1

LINKAGES

Conservation Hypotheses Addressed

- *Protecting water quality (All-1)*
- *Protecting and improving riparian vegetation (All-2)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (Low-1)*

Habitat Management Strategies

- *Rehabilitate riparian areas by establishing suitable native vegetation along banks of the mainstem and tributaries*
- *Substitute loss of slow water areas by creating new off-channel habitats and/or placement of large woody debris along banklines*
- *Substitute ecological processes with habitat features*

Project Description

This project would improve about 90 acres along Mill Creek. Habitat improvements would increase channel diversity, add large woody debris and native vegetation in the riparian corridor, and construct channel branches (dendrites) along the stream corridor.

This project is in response to high temperatures, poor water quality, and low dissolved oxygen levels that have been a detriment to the survival and rearing of fish in Mill Creek and have probably caused the death of fry spawned in Peasley Canyon

This is a Green/Duwamish Ecosystem Restoration Project.

Opportunities and Constraints

- This project depends on voluntary participation by property owners through easement, sale, or other incentives.

Project LG-9:
Rosso Nursery Off-Channel Rehabilitation and Riparian Restoration Between RM 20.8 and 20 (Left Bank)

Project Description

This project would rehabilitate habitat at the Rosso Nursery site between river miles 20.8 and 20.0 by constructing an outlet at RM 20.1. Actions would include removing fill, excavating off-channel flood refugium for juvenile rearing habitat, and planting native wetland and riparian vegetation.

Opportunities and Constraints

- The City of Kent received a Salmon Recovery Funding Board grant to acquire the site but does not have a specific proposal for salmon habitat rehabilitation.

View across the Green River toward the Rosso Nursery site.

LINKAGES

Conservation Hypotheses Addressed

- *Protecting water quality (All-1)*
- *Protecting and improving riparian vegetation (All-2)*
- *Preventing new bank/shoreline armoring and fill and removing existing armoring (All-6)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (Low-1)*

Habitat Management Strategies

- *Rehabilitate existing banklines to create low velocity and/or shallow water habitat during juvenile migration*
- *Rehabilitate off-channel habitat by reconnecting habitats to the mainstem*
- *Rehabilitate riparian areas by establishing suitable native vegetation along banks of the mainstem and tributaries*
- *Substitute loss of slow water areas by creating new off-channel habitats and/or placement of large woody debris along banklines*
- *Substitute ecological processes with habitat feature*

Project LG-10:
Mainstem Maintenance (including the Boeing Levee Setback and Habitat Rehabilitation) Between RM 20.5 and 16.3

Project Description

This project would improve fish habitat along the Lower Green River while providing stable bank and levee conditions to protect significant human infrastructure and development. These projects are being coordinated by local jurisdictions, the Green River Flood Control Zone District, and the U.S. Army Corps of Engineers.

The majority of the banks in this portion of the river have been hardened and trees and other fish friendly features have been removed to make the river flow without impediment. Riprap or rock bank protections have reduced fish habitat along this stretch of the river.

Sub-projects include:

- **Boeing Setback and Restoration Between RM 18 and 17.1 (Right Bank):**
  Set back the Boeing Levee between river miles 18 and 17.1, right bank, to enable extensive habitat rehabilitation. Actions include reshaping the bankline between the upstream end of the Christian Brothers Revetment and South 212th Street, widening the channel cross-section, restoring channel complexity and meanders, creating a two-stage channel, excavating low benches and alcoves, installing large woody debris, and planting native riparian vegetation. The proposed project is within City of Kent open space, which has a 200-foot buffer with restricted development.
- **Carrot Patch Setback and Restoration:**
  Implement fish friendly, bio-engineered solutions to levee maintenance problems. Set back the levee to enable habitat rehabilitation, including reshaping the bankline, widening the channel cross-section, restoring channel complexity and meanders, excavating low benches and installing large woody debris, and planting native riparian vegetation.
- **Russell Road Upper, Lower and Lowest Setback and Restorations:**
  Implement fish friendly, bio-engineered solutions to levee maintenance problems. Set back the levee to enable habitat rehabilitation, including reshaping the bankline, widening the channel cross-section, restoring channel complexity and meanders, excavating low benches and installing large woody debris, and planting native riparian vegetation.

These are Green/Duwamish Ecosystem Restoration Projects.

Opportunities and Constraints

- This project depends on voluntary participation by property owners through easement, sale, or other incentives.

View north across the Green River looking toward the Boeing Levee at river mile 17.6. April 2005 photo.

LINKAGES

Conservation Hypotheses Addressed

- *Protecting water quality (All-1)*
- *Protecting and improving riparian vegetation (All-2)*
- *Preventing new bank/shoreline armoring and fill and removing existing armoring (All-6)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (Low-1)*

Habitat Management Strategies

- *Rehabilitate riparian areas by establishing suitable native vegetation along banks of the mainstem and tributaries*
- *Rehabilitate existing banklines to create low velocity and/or shallow water habitat during juvenile migration*
- *Substitute loss of slow water areas by creating new off-channel habitats and/or placement of large woody debris along banklinesSubstitute ecological processes with habitat features*

Project LG-11:
Acquisition and Off-Channel Habitat Rehabilitation Between RM 17.3 and 16.0 (Left Bank) and Between Creek Miles 0 and 0.5 of Johnson Creek

Looking west toward the project area on the far side of the river. Johnson Creek is the hockey-stick shaped corridor of darker vegetation in the left third of the image. 200th St. crosses the Green River near the center of the photo. July 2004 photo.

LINKAGES

Conservation Hypotheses Addressed

- *Protecting and improving riparian vegetation (All-2)*
- *Improving tributary access (All-3)*
- *Preventing new bank/shoreline armoring and fill and removing existing armoring (All-6)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (Low-1)*

Habitat Management Strategies

- *Restore tributary access by removing fish passage barriers and modifying tributary mouth configuration*
- *Rehabilitate existing banklines to create low velocity and/or shallow water habitat during juvenile migration*
- *Rehabilitate off-channel habitat by reconnecting habitats to the mainstem*
- *Rehabilitate riparian areas by establishing suitable native vegetation along banks of the mainstem and tributaries*
- *Substitute loss of slow water areas by creating new off-channel habitats and/or placement of large woody debris along banklines*
- *Rehabilitate remaining wetlands adjacent to mainstem channel*
- *Substitute ecological processes with habitat features*

Project Description

Key actions for this project include excavation of a flood refugium for juvenile salmonid rearing habitat, realignment of the stream channel, improvement of fish passage, restoration of the wetland complex, placement of large woody debris, and planting of native wetland and riparian vegetation.

Consideration should be given to seeking a voluntary acquisition of river front easements, in combination with a partnership and incentives for the property owner, for additional off-channel habitat. The easements would make levee maintenance and improvements possible along this important reach of the river.

A portion of the property is listed as a Green/Duwamish Ecosystem Restoration Project, identified within the "Mainstem Maintenance" sites for significant levee repair and improvement.

Opportunities and Constraints

- A large development is proposed for this area and is being considered for permitting as of 2005. This property is subject to future annexation by the City of Tukwila.

Project LG-12:
Briscoe Off-Channel Habitat Rehabilitation Between RM 16.1 and 15.8 (Right Bank)

Project Description

Remove the armoring on the Briscoe meander shoreline, excavate flood refugium for juvenile salmonid rearing habitat, install large woody debris, and plant native riparian vegetation. An existing (landlocked) levee on the eastern boundary of the park would provide continued flood protection.

Opportunities and Constraints

- Permission and cooperation would have to be gained from the City of Kent.
- Park use is relatively low but the impact of proposed changes is unknown. Access to the river could be designed as an amenity for the remaining park area.

Briscoe Park looking north. Bike trail to right is on existing, landlocked levee. Portion of area to left would be excavated to create shallow water refuge habitat. February 2005 photo.

LINKAGES

Conservation Hypotheses Addressed

- *Protecting and improving riparian vegetation (All-2)*
- *Preventing new bank/shoreline armoring and fill and removing existing armoring (All-6)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (Low-1)*

Habitat Management Strategies

- *Rehabilitate existing banklines to create low velocity and/or shallow water habitat during juvenile migration*
- *Rehabilitate riparian areas by establishing suitable native vegetation along banks of the mainstem and tributaries*
- *Substitute loss of slow water areas by creating new off-channel habitats and/or placement of large woody debris along banklines*
- *Substitute ecological processes with habitat features*

Project LG-13:
Acquisition, Levee Setback, and Habitat Rehabilitation Between RM 15.3 and 14.7 (Right Bank)

Desimone Levee setback of 1998-1999 showing students planting nativetrees. This type of setback would be replicated just downstream in the proposed project. July 2003 photo.

LINKAGES

Conservation Hypotheses Addressed

- *Protecting and improving riparian vegetation (All-2)*
- *Preventing new bank/shoreline armoring and fill and removing existing armoring (All-6)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (Low-1)*

Habitat Management Strategies

- *Rehabilitate existing banklines to create low velocity and/or shallow water habitat during juvenile migration*
- *Rehabilitate riparian areas by establishing suitable native vegetation along banks of the mainstem and tributaries*
- *Substitute ecological processes with habitat features*

Project Description

Acquire additional right of way along the river-ward edge of the business park parking lot between river miles 15.3 and14.7 (right bank) set back the over-steepened levee, create bench habitat, install large woody debris, and plant native riparian vegetation. This project would extend downstream from a levee setback project completed in the late 1990s.

Opportunities and Constraints

- Acquisition of right of way needed for this project would require the agreement and cooperation of the property owner(s).

Project LG-14:
Off Channel and Wetland Habitat Creation at RM 13.50-12.5 (Right Bank)

Project Description

Create an engineered side-channel between river miles 13.5 and 12.5 (right bank), connecting and enhancing approximately 10 acres of wetlands located between the Union Pacific and BNSF Railway tracks. The project would create approximately 24 acres of floodplain access across seven parcels. It would be engineered to have water in the channel from January to July, the peak time of juvenile Chinook rearing and migration.

Opportunities and Constraints

- The side-channel would need to go underneath the West Valley Highway, the South Longacres Road, the I-405 Railroad Bridge and Union Pacific Railroad tracks, and include a water control structure at the inlet to meter the amount of water allowed into the side-channel.
- Several of the parcels are currently in public ownership.

LINKAGES

Conservation Hypotheses Addressed

- *Protecting and improving riparian vegetation (All-2)*
- *Preventing new bank/shoreline armoring and fill and removing existing armoring (All-6)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (Low-1)*

Habitat Management Strategies

- *Rehabilitate existing banklines to create low velocity and/or shallow water habitat during juvenile migration*
- *Rehabilitate off-channel habitat by reconnecting habitat to the mainstem*
- *Rehabilitate remaining wetlands adjacent to mainstem channel*
- *Rehabilitate riparian areas by establishing suitable native vegetation along banks of the mainstem and tributaries*
- *Substitute ecological processes with habitat features*

Project LG-15:
Off-Channel Habitat Rehabilitation Between RM 12.65 and 12.5 (Right Bank)

Lower Green River looking east. Project area extends to the right; I-405 is on the left. February 2005 photo.

LINKAGES

Conservation Hypotheses Addressed

- *Protecting and improving riparian vegetation (All-2)*
- *Preventing new bank/shoreline armoring and fill and removing existing armoring (All-6)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (Low-1)*

Habitat Management Strategies

- *Rehabilitate existing banklines to create low velocity and/or shallow water habitat during juvenile migration*
- *Rehabilitate off-channel habitat by reconnecting habitats to the mainstem*
- *Rehabilitate riparian areas by establishing suitable native vegetation along banks of the mainstem and tributaries*
- *Substitute loss of slow water areas by creating new off-channel habitats and/or placement of large woody debris along banklines*
- *Substitute ecological processes with habitat features*

Project Description

Restore historical flood refugia and off-channel rearing habitat on a riverside sheep pasture. Key actions include excavating and reconnecting an abandoned river channel segment, re-sloping the bankline of both the river side channel and the adjacent levee, installing instream and bench large woody debris, and planting riparian vegetation.

Opportunities and Constraints

- The project area is also scheduled for an expansion of the I-405, including a possible off ramp, and serve as a mitigation site.
- Property is owned by the City of Tukwila.

Project LG-16:
Gilliam Creek Fish Passage Improvements and Riparian Rehabilitation at RM 12.5 (Left Bank)

Project Description

This project would eliminate fish passage barriers and improve approximately 2,000 feet of Gilliam Creek to provide for enhanced rearing and refuge habitat while maintaining the current level of flood protection to the area. The project would add a fish ladder and self-regulating tidegate to the existing creek outlet, which currently consists of a flapgate and apron that prevent fish passage. The project would widen Gilliam Creek and add gravel, riparian vegetation, and large woody debris, enhancing approximately 2,000 feet of the Creek.

Project would remove the existing 9 foot flap gate at Gilliam Creek confluence with the Green River. Photo courtesy of U.S. Army Corps of Engineers.

Gilliam Creek drains approximately 1,900 acres. Its upper basin, contained within the city of SeaTac, is subject to poor water quality, erosion of the stream banks, and siltation within the stream corridor. The lower basin land use within the city of Tukwila is predominantly commercial and high-density residential property with storm drainage directed to Gilliam Creek.

This is a Green/Duwamish Ecosystem Restoration Project.

Opportunities and Constraints

- This project depends on voluntary participation by property owners through easement, sale, or other incentives.

Project would remove the existing nine-foot flap gate at Gilliam Creek confluence with the Green River. Photo courtesy of U.S. Army Corps of Engineers.

LINKAGES

Conservation Hypotheses Addressed

- *Protecting and improving riparian vegetation (All-2)*
- *Protecting and improving access to tributaries (All-3)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (Low-1)*

Habitat Management Strategies

- *Restore tributary access by removing fish passage barriers and modifying tributary mouth configuration*
- *Rehabilitate riparian areas by establishing suitable native vegetation along banks of the mainstem and tributaries*
- *Substitute ecological processes with habitat features*
- *Substitute sediment recruitment by gravel supplementation*

Project LG-17:
Levee Setback Between RM 11.7 and 11.4 (Right Bank)

Lower Green River looking downstream at river mile 11.7. To right is Fort Dent Park showing levee and possible bank set back area. February 2005 photo.

LINKAGES

Conservation Hypotheses Addressed

- *Protecting and improving riparian vegetation (All-2)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (Low-1)*

Habitat Management Strategies

- *Rehabilitate existing banklines to create low velocity and/or shallow water habitat during juvenile migration*
- *Rehabilitate riparian areas by establishing suitable native vegetation along banks of the mainstem and tributaries*
- *Substitute loss of slow water areas by placement of large woody debris along banklines*

Project Description

Set back the Fort Dent levee to the maximum extent possible to create a low vegetated bench between river miles 11.7 to 11.4, right bank, without affecting the existing soccer fields or trail. Plant native riparian vegetation and add large woody debris along the toe of slope and on the created bench.

This project would provide low velocity and/or shallow water habitat for juvenile salmon.

Opportunities and Constraints

- Permission must be obtained by the City of Tukwila, and implementers will need to work with the company that manages the soccer complex on this parcel to design this project in a way that minimizes impacts on current park operations. Sewer infrastructure may also present challenges for implementation.

Project LG-18:
Black River Marsh at RM 11.0 (Right Bank)

Project Description

This project would improve the confluence of the remnant Black River with the Green/Duwamish as an emergent marsh, increasing nutrient productivity for the surrounding system and improving access for salmonid refuge and rearing.

The project is located along the lower Black River, which empties into the Green River at river mile 11.0, right bank. The project would remove about 200 cubic yards of fill from the left bankline of the Black River at the confluence with the Green just west of the railroad tracks. This small area would then be planted with appropriate native marsh vegetation and a few large stumps with root wads would be placed to provide cover. A 50 foot wide riparian buffer would be created along the banks of the Black River from the Black River Pump Station to the confluence.

This is a Green/Duwamish Ecosystem Restoration Project.

Opportunities and Constraints

- The site has significant infrastructure that will make site rehabilitation challenging. Invasive plant species now dominate the site.
- In 2005, volunteers organized by a Renton resident began planting native trees and shrubs on the south bank of the Black River just west of the Black River Pump Station.

Black River confluence with the Green/Duwamish. Black River is to right. Railroad bridges are visible in the distance. February 2005 photo.

LINKAGES

Conservation Hypotheses Addressed

- *Protecting and improving riparian vegetation (All-2)*
- *Preventing new bank armoring and removing existing armoring (All-6)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (Low-1)*

Habitat Management Strategies

- *Rehabilitate riparian areas by establishing suitable native vegetation along banks of the mainstem and tributaries*
- *Substitute loss of slow water areas by creating new off-channel habitats and/or placement of large woody debris along banklines*
- *Substitute ecological processes with habitat features*

Project LG-19:
Lower Springbrook Reach Rehabilitation at Creek Mile 1.0 (Both Banks)

Lower Springbrook Creek showing lack of native vegetation. Photo courtesy of U.S. Army Corps of Engineers.

LINKAGES

Conservation Hypotheses Addressed

- *Protecting and improving riparian vegetation (All-2)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (Low-1)*

Habitat Management Strategies

- *Rehabilitate riparian areas by establishing suitable native vegetation along banks of the mainstem and tributaries*
- *Substitute loss of slow water areas by placement of large woody debris along banklines*
- *Substitute ecological processes with habitat features*

Project Description

This project would rehabilitate habitat for rearing and off-channel refuge on Springbrook Creek. Springbrook Creek is a tributary to the Black River. Approximately 4,500 feet of Springbrook would be improved with riparian plantings, large woody debris, pool construction, channel branch (dendrite) excavation, and, where appropriate, modification to create a 2-stage (low- and high-flow) channel.

This is a Green/Duwamish Ecosystem Restoration Project.

Opportunities and Constraints

- Because Springbrook is spring fed, water quality is generally good. Riparian vegetation is dominated by invasive plants, however, which do not create shade, refuge or instream diversity.
- This project depends on voluntary participation by property owners through easement, sale, or other incentives.